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Review Article

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Fungi, Bacteria and Parasites are Associated with Autism? Incidence in Colombia - South America

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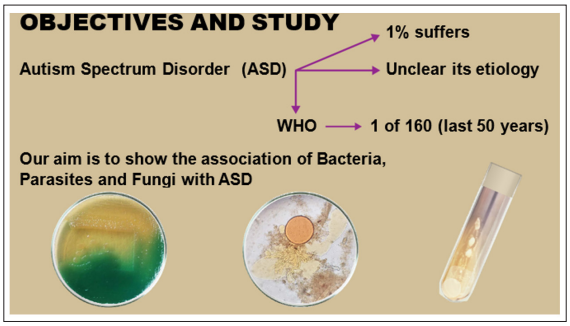
Objectives and Study

It is estimated that 1.0% of the global population suffers from autism spectrum disorder (ASD), and its pathogenesis remains unclear. According to the World Health Organization, approximately one in 160 children is affected by ASD, with a notable increase over the past 50 years. Our aim is to emphasize the importance of studying the microbiota of individuals with ASD, focusing on the presence of bacteria, fungi, and/or parasites, as several studies have shown associations between these microorganisms and ASD.



Methods

Different etiologies were investigated in fecal samples, including parasites, fungi, and bacteria such as Yersinia, Klebsiella, Morganella, Salmonella, Proteus, Pseudomonas, Shigella, and Serratia. The samples were collected and processed within one to two hours after collection. Feces were cultured on MacConkey agar, EMB (Eosin Methylene Blue) agar, CLED (Cystine-Lactose-Electrolyte Deficient) medium with Andrade Indicator and selective media for Campylobacter. Fungal cultures were grown on Sabouraud Dextrose Agar or Potato Dextrose Agar. All cultures were incubated at 22°C for fungi and 37°C for bacteria.

Samples

They were collected and processed within 1 to 2 hours after collection. If the samples are collected outside the city, the samples were taken in a Transport Media Tube.

Bacterias

They were cultured on MacConkey agar, EMB (Eosin Methylene Blue) agar, CLED (Cystine-Lactose-Electrolyte Deficient) medium with Andrade Indicator and selective media for Campylobacter, Mueller Hinton agar to do the AST (Antibiotic Susceptibility Test).

Fungi

Cultured on Sabouraud Dextrose Agar or Potato Dextrose Agar and incubated at 22°C.

Parasites

In a microscope with Saline Solution and Parasitological Lugol, observed in 40X and Gram 100x.

Results

A total of 117 cases were analyzed, with 23% female and 77% male participants, between the ages of 2 and 11. The most frequent parasites identified were: 59.4% Entamoeba

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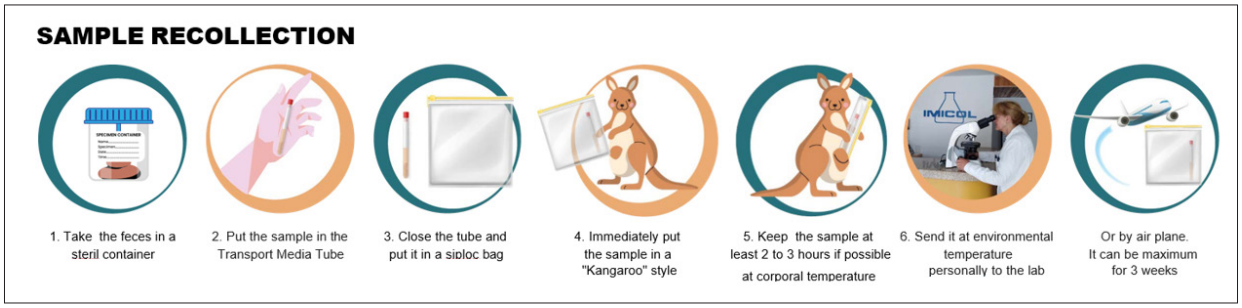
histolytica, 29.7% Strongyloides stercoralis, and 8.9% Ascaris lumbricoides. Fungi identified, included 47.9% Candida. The most prevalent bacterial species were: 48.8% Escherichia coli and 18.0% Yersinia enterocolitica, among others.

Sample Recollection

- Take the feces in a steril container
- Put the sample in the Transport Media Tube
- Close the tube and put it in a siploc bag
- Immediately put the sample in a “Kangaroo” style
- Keep the sample at least 2 to 3 hours if posible at corporal temperature
- Send it at environmental temperature personally to the lab
- Or by air plane. It can be maximum for 3 weeks



Bacteria Cultures

For: Escherichia, Yersinia, Klebsiella, Proteus, Serratia, Campylobacter, Morganella, Salmonella, Pseudomonas, Shigella.

Results

A total of 117 cases were analyzed, with 23% female and 77% male participants, between the ages of 2 and 11. The most frequent parasites identified were: 59.4% Entamoeba histolytica, 29.7% Strongyloides stercoralis, and 8.9% Ascaris lumbricoides. Fungi identified, included 47.9% Candida. The most prevalent bacterial species were: 48.8% Escherichia coli and 18.0% Yersinia enterocolitica, among others.

Conclusions

This study highlights the importance of early detection of dysbiosis in children with ASD. Our findings indicate that multiple etiologies may be involved, and the study supports the relationship between the gut microbiome and their symptoms and behavior. In a follow-up survey conducted with parents after treatment, 88% reported significant improvements. Plus, it can reduce the autism cost in US.